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BESTSDI – Western Balkans Academic Education
Evolution and Professional's Sustainable Training for
Spatial Data Infrastructures

With the support of the Erasmus+ program:

*Higher Education – International Capacity Building
N° 574150-EPP-1-2016-1-HR-EPPKA2-CBHE-JP*

BEST **SDI** Task Report

Task 2.9: Revision of project curriculum

Version 0.1

Author(s)/Organisation(s)/Partner number:

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Work Package / Task:

WP2B – Implementation of curriculum / T2.9 – Revision of project curriculum

References:

WP2B Work plan / Project curriculum specifications, Localised courses

Short Description:

This report is the final report of TaskGroup 2.9 – Revision of project curriculum. It is based on the outcomes of T2.7 and T2.8 as well as of the revision of the learning material done by the partners.

Keywords:

Curriculum, evaluation, revision, final project curriculum

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Revision History:

Revision	Date	Author(s)	Status	Description
V0.1	08.07.2019	Ulrike Klein	Draft	Initial draft
V0.2	03.09.2019	Ulrike Klein	Draft	
V0.3	30.10.2019	Ulrike Klein	Final Version	



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1. Introduction

Work package “**Development**” was presented in two separate parts:

- Development of curriculum (WP2A)
- Implementation of curriculum (WP2B)

to achieve clarity and better overview of activities which will be undertaken in it.

The goal of the second part of WP2 “Development” – **WP2B “Implementation of Curriculum”** was that each partner university implements, reviews and enhances a modified version of the project curriculum developed under D2.1 - D.2.5 in its own curricula. In practice the goal of this WP primarily was to implement and conduct the developed and localised project curriculum at each partner country partner university/faculty in third year of project lifetime.

WP2B expected results were:

- to implement localised courses from the Project SDI curriculum at the partner countries partner universities/faculties,
- to lecture localised courses at the partner countries partner universities/faculties in third year of project lifetime (ac. year 2018/2019),
- to evaluate execution of localised courses in context of content, volume, lecturing methodology and appropriateness of practical part of lecture,
- to revise developed Project SDI curriculum in light of executed courses and evaluation made and make improvements where issues were detected, resulting in final Project SDI curriculum ready for publication.

Milestones for WP2B were:

- implementation of adopted curriculum/courses at partner universities (M20, M26)
- implemented curriculum/courses at partner universities evaluated (M21, M27)
- conducted and evaluated curriculum/courses updated (M30, M36)

The WP2B was subdivided into four tasks:

Task 2.6 – Implementation of local curriculum

Task 2.7 – Running the courses to students

Task 2.8 – Evaluation of implementation

Task 2.9 – Revision of project curriculum

The tasks 2.6 and 2.7 were responsible of and executed by partner country partners. Parallel to the execution of the courses was evaluated based on perception of students and teachers regarding content of courses, implemented methodology, implemented practical part of courses and



appropriateness of examples, software and introduced exercises. Special training and instructions were given to teachers teaching new courses regarding the evaluation of implementation among the students and teachers itself. Mentioned activities were task of Task group 2.8.

In Task 2.9 an independent evaluation of the parts of the project curriculum by experts from other partners was conducted. Task group 2.9 had to revise evaluation results and assess need to revise and improve project curriculum or specific localised course/part of course. If such assessment shows need for improvement, the course had to be revised and improved in accordance to evaluation results and deliver final course/part of course documentation.

To fulfill mentioned task following activities were executed by Task group 2.9:

- define procedure of revision of project curriculum topics,
- assess revision results and decide about the need to launch process of improvement of project curriculum, localized course or part of course,
- provide report of task group work in M30 and M34.

2. Indicators and Deliverables

The task will produce the following deliverables:

Number	Title	Date
D2.9	Updated project curriculum	M36

The task will be monitored and evaluated by the following indicators and targets (see LFM section G, p 72).

Number	Indicator	Assessment method	Target value
1	I2.9	Analysis of evaluation reports resulting in courses which have to be improved	Number of courses with improvement needs under 20% of total value of conducted courses

3. Methodology

Activities of Task group 2.9 were

- define procedure of revision of project curriculum topics
- assess revision results and decide about the need to launch process of improvement of project curriculum, localized course or part of course, proposal will be made by sub-group and acceptance by task group on plenary meetings, done by whole task group,



- provide report of task group work in M30 and M34.

For the revision of curriculum topics a list with partners which will execute revision was presented and approved in BestSDI Meeting in NoviSad (see Table 1). The partners got the task to evaluate the assigned curriculum topics and upload them in the Moodle Platform. A formal structure for evaluation of the project curriculum was not given. It was assumed that the evaluation will be done in form of a formal scientific evaluation.

Module	Title	Author	Status	“Revisor”
Module 1:	SDI concepts and principles			
T1-1.	The use of spatial data in different application domains	A. Wytzisk	Delivered	UNIPZ
T1-2.	Existing barriers to access and use spatial data: non-harmonisation, licensing and pricing, restricted use, ...;	D. Vandenbroucke	Delivered	UNIZG FOG (Ž.B.)
T1-3.	SDI's as answer to resolve barriers	Z. Bogdanovski	Delivered	UKIM (Z.S.)
T1-4.	Components of SDI	D. Tutić	Delivered	UNITZ
T1-5.	Different types of SDI	A. Radulović	Delivered	UNSA
T1-6.	Main geospatial standards	M. Amović	Delivered	UNIST
T1-7.	Examples of existing SDI's, their evolvement over time and comparison worldwide	Ž. Bačić	Missing	UBT (B.A.)
Module 2:	SDI at work			
T2-1.	Introducing the publish-search-find-bind paradigm	A. Wytzisk	Delivered	UNS FTS
T2-2.	The role of metadata in SDI-Discovery and evaluation of metadata;	U. Klein	Delivered	UNIST
T2-3.	The role of catalogues and catalogue services, and the concept of harvesting catalogues	J. Kilić	Delivered	UNSA
T2-4.	How to evaluate whether a data set, or a service is of the required quality and is fit for purpose (fit for intended use)	D. Tutić	Missing	UNIBL
T2-5.	Examples and exercises to search for specific data sets and services	G.Gjata	Delivered	KUL (D.V.)
T2-6.	Providing examples of good geoportals and open data portal	S. Ključanin	Delivered	UNITZ



Module 3: SDI Data Modelling and Data Harmonisation				
T3-1.	Reading and using the UML conceptual modelling language (including how to read application schema's);	D. Tutić	Delivered	UNIZG FGE
T3-2.	Modelling our universe of discourse: spatial, temporal and other aspects	D. Tutić	Delivered	UNIZG FGE
T3-3.	Difference between conceptual, logical and physical data models;	Z. Srbinoski	Delivered	UKIM (Z.B.)
T3-4.	ISO 19100 series of standards: reference model, spatial schema, temporal schema, rules for application schema, portrayal, data product specification, ...;	U. Klein	Delivered	UNIZG FOG (D.T.)
T3-5.	Encoding mechanisms and data exchange formats (including XML, GML and RDF);	N. Kranjčić	Delivered	UNIPZ
T3-6.	Explaining and analysing examples of product specifications and INSPIRE data specifications in particular (examples to be chosen depending on the field of interest)	M. Knežević et al.	Missing	AUT
T3-7.	Data harmonisation and semantic interoperability	E. Hoxha	Missing	KUL (D.V.)
T3-8.	The role of ontologies and vocabularies	D. Tutić	Missing	UNIBL
T3-9.	Comparing existing data sets or data models against specifications	D. Vandenbroucke	Missing	UNS FTS Iz 1.4
T3-10.	Methods and steps for data transformation and the definition of syntactic and semantic transformation rules	D. Vandenbroucke	Missing	UNIPZ
T3-11.	Data quality and validation of transformed data.	S. Vasiljević	Delivered	UNIST (I.R.)
Module 4: SDI Access Mechanisms				
T4-1.	Fundamentals on how the WWW works, the technology stack and protocols used, its basic operations and the importance of URI's, URL's and URN's	D. Tutić	Delivered	HBO (A.W.)



T4-2.	Architecture patterns and overview of the Service Oriented Architectures used in most SDI's, based on at least three tiers: data, applications (clients) and services	N. Preniqui	Delivered	HBO (A.W.)
T4-3.	Web services: what are they; what can they do; how do they work and what are different types of web services	U. Klein	Delivered	UNSA
T4-4.	OGC web service interfaces for accessing, discover, download, visualize, process ... geospatial data	N. Kranjčić	Delivered	UNS FTS
T4-5.	Detailed explanation and discussion on how WMS, WFS and CSW work, including examples from INSPIRE;	N. Kranjčić	Delivered	UNIST
T4-6.	Discussing the need for elaborating a good strategy for service implementation: how to implement portrayal, how to organise layers (in case of WMS); potential issues of performance; ...	Z. Srbinoski	Delivered	UKIM (G.G.)
T4-7.	Overview of support of OGC web services in popular GIS software	U. Klein	Delivered	PUT FCE
T4-8.	Exercises to set-up different type of OGC web services such as WMS/WMTS, WFS, CSW	S. Vasiljević	Delivered	HBO (A.W.)
Module 5:	SDI Assessment and Quality Issues			
T5-1.	Quality Assurance in the context of SDI's	S. Ključanin	Delivered	UNITZ
T5-2.	The difference between QA of spatial data production and data products (in terms of accuracy, completeness ...) and QA of SDI components	D. Tutić	Missing	UNIPZ
T5-3.	The difference between QA and conformity/ compliancy with standards and specifications in the context of SDI	D. Tutić	Missing	UCG
T5-4.	Detailed QA and quality control issues related to metadata and catalogues: problems and issues that might occur, including examples and how to solve them	J. Kilić	Missing	UBT
T5-5.	Quality and experience of Services	A. Radulović	Delivered	UNIZG



				FGE
T5-6.	Methods for testing and validating harmonized data against data specifications including examples	M. Amović	Missing	UNS FCE
T5-7.	Overview of tools and environments to perform testing and validation	D. Vandembroucke	Missing	AUT
T5-8.	SDI Assessment	Z. Bacic	Delivered	KUL (D.V.)
T5-9.	Exercise to explore different SDI's	Z. Bogdanovski	Delivered	KUL (J.C.)
T5-10.	Introducing aspects related to value, cost/benefits and performance management in the context of SDI's	Ž. Bačić	Missing	UNSA (S.K.)
Module 6:	Non-technological developments			
T6-1.	Geospatial data and their integration with other data/information for different applications	H. Čustović	Delivered	UNITZ
T6-2.	E-Government processes and the location enablement their G2C, G2B and G2G interactions	N. Kranjčić	Delivered	KUL (J.C.)
T6-3.	Analysis of typical e-Government processes and modelling them using the BPMN (standard) language	N. Kranjčić	Delivered	KUL (J.C.)
T6-4.	Detailed overview and comparison of relevant European (and national) legislation with regard to GI and other public sector information: INSPIRE, PSI, Aarhus & Access...	Z. Srbinoski	Delivered	UPT FGM
T6-5.	How to share spatial data to a maximum degree, while protecting sensitive information (such as personal information)	U. Klein	Missing	UNIBG
T6-6.	Overview of different license and business models for the distribution of spatial data (including the Creative Commons framework)	D. Tutić	Missing	UNIZG FGE
T6-7.	The Open Data movement and the application of Open Data principles in the	D. Tutić	Missing	UCG



	context of SDI in different countries of Europe			
T6-8.	Authoritative spatial data and official registries and/versus volunteered geographic information and crowdsourcing	M. Knežević	Missing	UNIBL
Module 7:	Technological trends			
T7-1.	Overview of the major developments and trends as defined by UN-GGIM and OGC (with focus on technological trends)	D. Tutić	Missing	HBO (A.W.)
T7-2.	New ways of data acquisition and new data sources	Z. Bogdanovski	Delivered	UKIM (Z.S.)
T7-3.	Major programmes to support better and more data, more accessible and easier to use: Copernicus and GNSS, Galileo, ...	Ž. Bačić	Missing	UNIBG
T7-4.	The influence of huge amounts of data on the way we work (big data): cloud computing; workflow and provenance; big data analytics; big data coming from social networks/media; etc.	M. Amović	Missing	HBO (A.W.)
T7-5.	3D/4D geospatial data: space and time including the provision of examples on: moving objects in space (eye-tracking), agent-based modelling (indoor/outdoor); augmented reality (looking to the past and into the future); etc.	D. Tutić	Missing	UNITZ
T7-6.	New ways to publish and use geospatial data on the web by making use of semantic web technology	M. Amović	Delivered	UNIZG FOG (V.P.-P.)
T7-7.	SDI to improve sharing and exchanging data, but taking into account sensitive information by using secure access mechanisms and protection of (spatial) features	D. Vandenbroucke	Missing	UNIBG
Module 8:	SDI for Thematic Applications			
T8-1.	Overview of relevant European Directives and national legislation in the	M. Knežević et al.	Missing	PUT FCE



	thematic (and related) fields			
T8-2.	Overview and analysis of specific spatial data models and comparison with the relevant INSPIRE specifications: examples of existing data sets;	Z. Srbinoski	Delivered	UPT FGM
T8-3.	Analysis of differences and commonalities between different data sets and identification of specific challenges to link/integrate them	D. Tutić	Missing	UNS FCE
T8-4.	Approaches to making the linking and integration of disparate data resources from the same application field including some exercises	S. Vasiljević	Delivered	UNSA
T8-5.	Identification of specific metadata initiatives and specifications, and different ways to handle and describe the metadata	U. Klein (D. Vandenbroucke)	Missing	UNIST
T8-6.	Analysing metadata records and comparing them with basic discovery metadata collected in SDI catalogues	U. Klein (D. Vandenbroucke)	Missing	PUT FCE
T8-7.	Visit to and exploration of specific platforms and tools: small assignments to access and use the available information/data.	D. Tutić	Missing	Drop out
Module 9:	SDI Application Development			
T9-1.	Different approaches and different steps in applications development	A. Wytzisk	Delivered	UBT
T9-2.	Methods for requirements analysis in GI	A. Wytzisk	Delivered	UNIPZ
T9-3.	Some examples and exercises to identify use cases given a pre-defined work process for different actors	D. Vandenbroucke	Missing	AUT
T9-4.	Methods for mapping and describing business/work processes to identify the activities, the actors and interactions that take place, and the role of data and geographic information in those processes in particular	D. Vandenbroucke	Missing	UCG



T9-5.	The design of usable user interfaces to support the many interactions in the work process: using mock-ups to create a first visual outline of the intended interfaces	A. Wytzisk	Delivered	UNIBL
T9-6.	What are and how do Agile development methods work, such as Scrum: the interactive approach through the organisation of sprints	D. Vandembroucke	Missing	Drop out
T9-7.	What are Application Programming Interfaces (API's) and what are geospatial API's: examples of how they are used in the context of SDI	D. Tutić	Missing	UNIBG
T9-8.	Zooming in on different geospatial API's such as OpenLayers, OpenStreetMap, Leaflet, etc. Smaller exercises to use these environments to carry out simple GIS tasks	D. Tutić	Missing	UNIBG

Table 1: Partners responsible for revision of project curriculum

The Internal time plan of the task group looks as follows for first and every other monitoring report:

Activity	Title	Date
1	List of partners responsible for revision of curriculum topics with names of team members which will execute revision will be defined and approved	April 2019
2	All missing curricula topics should be submitted	May 2019
3	All revisions should be done and submitted	July 2019
4	Analysis of revised learning material	September 2019
5	Revision of Project Curriculum	September 2019

4. Results from Revision of Project Curriculum by partners

In total 26 of the 43 delivered parts of the project curriculum were evaluated. The revisions were made in different forms, either as Review Reports or as further development of the learning material (see Figure 1).



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Different Forms of Evaluation

The figure displays three examples of evaluation results. The first is a 'Review Report' from the University of Zagreb, detailing the review of a manuscript. The second is 'Further development of learning material', showing a hierarchical diagram of UML diagrams and their application in system development. The third is 'Learning Units / Concepts', which lists various technical concepts and their relevance to the curriculum.

Figure 1: Different forms of evaluation results

The revisions were classified by TaskGroup 2.9 in the four categories “Approved without changes”, “Approved with minor changes”, “Approved with changes”, “Not approved”. Twelve parts of the project curriculum can be used without further changes, six need minor revision. For eight courses a more intensive revision is necessary. Table 2 shows the result of the classification.

Total Parts of Project Curriculum	72				
Total Parts of Project Curriculum Delivered	42				
		Approved without changes	Approved with minor changes	Approved with changes	Not approved
Total Parts of Project Curriculum Revised	26	12	6	8	0

Table 2: Results of Classification of Revision

All results in detail for each part of the project curriculum can be found in Table 3. All original revisions are uploaded in the Moodle Platform.



Module	Title	Author	Status	“Revisor”	Status	Approved without changes	Approved with minor changes	Approved with changes	Not approved
Module 1: SDI concepts and principles									
T1-1.	The use of spatial data in different application domains	A. Wytzisk	Delivered	UNIPZ	Delivered		x		
T1-2.	Existing barriers to access and use spatial data: non-harmonisation, licensing and pricing, restricted use, ...;	D. Vandenbroucke	Delivered	UNIZG FOG (Ž.B.)	Missing				
T1-3.	SDI's as answer to resolve barriers	Z. Bogdanovski	Delivered	UKIM (Z.S.)	Delivered	x			
T1-4.	Components of SDI	D. Tutić	Delivered	UNITZ	Delivered	x			
T1-5.	Different types of SDI	A. Radulović	Delivered	UNSA	Delivered	x			
T1-6.	Main geospatial standards	M. Amović	Delivered	UNIST	Delivered	x			
T1-7.	Examples of existing SDI's, their evolvement over time and comparison worldwide	Ž. Bačić	Missing	UBT (B.A.)	Missing				
Module 2: SDI at work									
T2-1.	Introducing the publish-search-find-bind paradigm	A. Wytzisk	Delivered	UNS FTS	Delivered		x		
T2-2.	The role of metadata in SDI-Discovery and evaluation of metadata;	U. Klein	Delivered	UNIST	Missing				



T2-3.	The role of catalogues and catalogue services, and the concept of harvesting catalogues	J. Kilić	Delivered	UNSA	Delivered			x	
T2-4.	How to evaluate whether a data set, or a service is of the required quality and is fit for purpose (fit for intended use)	D. Tutić	Missing	UNIBL	Missing				
T2-5.	Examples and exercises to search for specific data sets and services	G.Gjata	Delivered	KUL (D.V.)	Missing				
T2-6.	Providing examples of good geoportals and open data portal	S. Ključanin	Delivered	UNITZ	Delivered	x			
Module 3: SDI Data Modelling and Data Harmonisation									
T3-1.	Reading and using the UML conceptual modelling language (including how to read application schema's);	D. Tutić	Delivered	UNIZG FGE	Delivered	x			
T3-2.	Modelling our universe of discourse: spatial, temporal and other aspects	D. Tutić	Delivered	UNIZG FGE	Delivered	x			
T3-3.	Difference between conceptual, logical and physical data models;	Z. Srbinoski	Delivered	UKIM (Z.B.)	Delivered	x			



T3-4.	ISO 19100 series of standards: reference model, spatial schema, temporal schema, rules for application schema, portrayal, data product specification, ...;	U. Klein	Delivered	UNIZG FOG (D.T.)	Missing				
T3-5.	Encoding mechanisms and data exchange formats (including XML, GML and RDF);	N. Kranjčić	Delivered	UNIPZ	Missing				
T3-6.	Explaining and analysing examples of product specifications and INSPIRE data specifications in particular (examples to be chosen depending on the field of interest)	M. Knežević et al.	Delivered	AUT	Missing				
T3-7.	Data harmonisation and semantic interoperability	E. Hoxha	Missing	KUL (D.V.)	Missing				
T3-8.	The role of ontologies and vocabularies	D. Tutić	Missing	UNIBL	Missing				
T3-9.	Comparing existing data sets or data models against specifications	D. Vandenbroucke	Missing	UNS FTS iz 1.4	Missing				
T3-10.	Methods and steps for data transformation and the definition of syntactic and semantic transformation rules	D. Vandenbroucke	Missing	UNIPZ	Missing				



T3-11.	Data quality and validation of transformed data.	S. Vasiljević	Delivered	UNIST (I.R.)	Missing				
Module 4: SDI Access Mechanisms									
T4-1.	Fundamentals on how the WWW works, the technology stack and protocols used, its basic operations and the importance of URI's, URL's and URN's	D. Tutić	Delivered	HBO (A.W.)	Delivered			x	
T4-2.	Architecture patterns and overview of the Service Oriented Architectures used in most SDI's, based on at least three tiers: data, applications (clients) and services	N. Prenjui	Delivered	HBO (A.W.)	Delivered			x	
T4-3.	Web services: what are they; what can they do; how do they work and what are different types of web services	U. Klein	Delivered	UNSA	Delivered	x			
T4-4.	OGC web service interfaces for accessing, discover, download, visualize, process ... geospatial data	N. Kranjčić	Delivered	UNS FTS	Delivered		x		
T4-5.	Detailed explanation and discussion on how WMS, WFS and CSW work, including examples from INSPIRE;	N. Kranjčić	Delivered	UNIST	Missing				



T4-6.	Discussing the need for elaborating a good strategy for service implementation: how to implement portrayal, how to organise layers (in case of WMS); potential issues of performance; ...	Z. Srbinoski	Delivered	UKIM (G.G.)	Delivered	x			
T4-7.	Overview of support of OGC web services in popular GIS software	U. Klein	Delivered	PUT FCE	Missing				
T4-8.	Exercises to set-up different type of OGC web services such as WMS/WMTS, WFS, CSW	S. Vasiljević	Delivered	HBO (A.W.)	Delivered			x	
Module 5: SDI Assessment and Quality Issues									
T5-1.	Quality Assurance in the context of SDI's	S. Ključanin	Delivered	UNITZ	Delivered	x			
T5-2.	The difference between QA of spatial data production and data products (in terms of accuracy, completeness ...) and QA of SDI components	D. Tutić	Missing	UNIPZ	Missing				
T5-3.	The difference between QA and conformity/ compliancy with standards and specifications in the context of SDI	D. Tutić	Missing	UCG	Missing				



T5-4.	Detailed QA and quality control issues related to metadata and catalogues: problems and issues that might occur, including examples and how to solve them	J. Kilić	Missing	UBT	Missing				
T5-5.	Quality and experience of Services	A. Radulović	Delivered	UNIZG FGE	Delivered		x		
T5-6.	Methods for testing and validating harmonized data against data specifications including examples	M. Amović	Missing	UNS FCE	Missing				
T5-7.	Overview of tools and environments to perform testing and validation	D. Vandenbroucke	Missing	AUT	Missing				
T5-8.	SDI Assessment	Z. Bacic	Delivered	KUL (D.V.)	delivered		x		
T5-9.	Exercise to explore different SDI's	Z. Bogdanovski	Delivered	KUL (J.C.)	Delivered		x		
T5-10.	Introducing aspects related to value, cost/benefits and performance management in the context of SDI's	Ž. Bačić	Missing	UNSA (S.K.)	Missing				
Module 6: Non-technological developments									
T6-1.	Geospatial data and their integration with other data/information for different applications	H. Čustović	Delivered	UNITZ	Delivered	x			



T6-2.	E-Government processes and the location enablement their G2C, G2B and G2G interactions	N. Kranjčić	Delivered	KUL (J.C.)	Delivered			x	
T6-3.	Analysis of typical e-Government processes and modelling them using the BPMN (standard) language	N. Kranjčić	Delivered	KUL (J.C.)	Delivered			x	
T6-4.	Detailed overview and comparison of relevant European (and national) legislation with regard to GI and other public sector information: INSPIRE, PSI, Aarhus & Access...	Z. Srbinoski	Delivered	UPT FGM	Missing				
T6-5.	How to share spatial data to a maximum degree, while protecting sensitive information (such as personal information)	U. Klein	Missing	UNIBG	Missing				
T6-6.	Overview of different license and business models for the distribution of spatial data (including the Creative Commons framework)	D. Tutić	Missing	UNIZG FGE	Missing				



T6-7.	The Open Data movement and the application of Open Data principles in the context of SDI in different countries of Europe	D. Tutić	Missing	UCG	Missing				
T6-8.	Authoritative spatial data and official registries and/versus volunteered geographic information and crowdsourcing	M. Knežević	Missing	UNIBL	Missing				
Module 7: Technological trends									
T7-1.	Overview of the major developments and trends as defined by UN-GGIM and OGC (with focus on technological trends)	D. Tutić	Missing	HBO (A.W.)	Missing				
T7-2.	New ways of data acquisition and new data sources	Z. Bogdanovski	Delivered	UKIM (Z.S.)	Missing				
T7-3.	Major programmes to support better and more data, more accessible and easier to use: Copernicus and GNSS, Galileo, ...	Ž. Bačić	Missing	UNIBG	Missing				
T7-4.	The influence of huge amounts of data on the way we work (big data): cloud computing; workflow and provenance; big data analytics; big data coming from social networks/media; etc.	M. Amović	Missing	HBO (A.W.)	Missing				



T7-5.	3D/4D geospatial data: space and time including the provision of examples on: moving objects in space (eye-tracking), agent-based modelling (indoor/outdoor); augmented reality (looking to the past and into the future); etc.	D. Tutić	Missing	UNITZ	Missing				
T7-6.	New ways to publish and use geospatial data on the web by making use of semantic web technology	M. Amović	Delivered	UNIZG FOG (V.P.-P.)	Delivered			x	
T7-7.	SDI to improve sharing and exchanging data, but taking into account sensitive information by using secure access mechanisms and protection of (spatial) features	D. Vandenbroucke	Missing	UNIBG	Missing				
Module 8: SDI for Thematic Applications									
T8-1.	Overview of relevant European Directives and national legislation in the thematic (and related) fields	M. Knežević et al.	Delivered	PUT FCE	Missing				
T8-2.	Overview and analysis of specific spatial data models and comparison with the relevant INSPIRE specifications: examples of existing data sets;	Z. Srbinoski	Delivered	UPT FGM	Missing				



T8-3.	Analysis of differences and commonalities between different data sets and identification of specific challenges to link/integrate them	D. Tutić	Missing	UNS FCE	Missing				
T8-4.	Approaches to making the linking and integration of disparate data resources from the same application field including some exercises	S. Vasiljević	Delivered	UNSA	Delivered			x	
T8-5.	Identification of specific metadata initiatives and specifications, and different ways to handle and describe the metadata	U. Klein (D. Vandembroucke)	Missing	UNIST	Missing				
T8-6.	Analysing metadata records and comparing them with basic discovery metadata collected in SDI catalogues	U. Klein (D. Vandembroucke)	Missing	PUT FCE	Missing				
T8-7.	Visit to and exploration of specific platforms and tools: small assignments to access and use the available information/data.	D. Tutić	Missing	Drop out	Missing				
Module 9: SDI Application Development									
T9-1.	Different approaches and different steps in applications development	A. Wytzisk	Delivered	UBT	Missing				



T9-2.	Methods for requirements analysis in GI	A. Wytzik	Delivered	UNIPZ	Missing				
T9-3.	Some examples and exercises to identify use cases given a pre-defined work process for different actors	D. Vandenbroucke	Missing	AUT	Missing				
T9-4.	Methods for mapping and describing business/work processes to identify the activities, the actors and interactions that take place, and the role of data and geographic information in those processes in particular	D. Vandenbroucke	Missing	UCG	Missing				
T9-5.	The design of usable user interfaces to support the many interactions in the work process: using mock-ups to create a first visual outline of the intended interfaces	A. Wytzik	Delivered	UNIBL	Missing				
T9-6.	What are and how do Agile development methods work, such as Scrum: the interactive approach through the organisation of sprints	D. Vandenbroucke	Missing	Drop out	Missing				



T9-7.	What are Application Programming Interfaces (API’s) and what are geospatial API’s: examples of how they are used in the context of SDI	D. Tutić	Missing	UNIBG	Missing				
T9-8.	Zooming in on different geospatial API’s such as OpenLayers, OpenStreeMap, Leaflet, etc. Smaller exercises to use these environments to carry out simple GIS tasks	D. Tutić	Missing	UNIBG	Missing				

Table 3: Results of Revision of Project Curriculum in Detail

5. CONCLUSIONS

The delivered parts of the project curriculum were mostly of a very high quality. Some improvements need to be done before final publication of the learning materials, but this should be done by the authors of the courses. For the missing learning material the procedure should be repeated, but this time in a more structured manner.